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E. J. Stone, Esq., Vice President, in the Chair.

Dr. Hugo Gyldén, The Observatory, Stockholm;
Prof. Edward C. Pickering, Harvard College, U.S.;
Signor W. Tempel, The Observatory, Arcetri, Florence;
Prof. F. Tietjen, The Observatory, Berlin; and
Mons. F. Tisserand, Paris;

were balloted for and duly elected Associates of the Society.

The Geographical Position of the Observatory of the John C. Green School of Science at Princeton, N. Jersey, U.S.A. By Professor C. A. Young.

This Observatory was established in 1877 mainly for the purpose of instruction in Practical Astronomy. It is equipped with a $9\frac{1}{2}$-inch Equatoreal; a Meridian Circle of 4 inches aperture, with circles 2 feet in diameter; two Transit instruments of 3 and $2\frac{3}{4}$ inches aperture; and a 3-inch Prime Vertical Transit; also with the usual accessories of clocks, chronograph, micrometers, sextants, &c.

The longitude of the Meridian Circle was determined in 1878–79 by telegraphic connection with Washington. At that place the observations and reductions were made almost entirely by Asst. H. M. Paul; at Princeton the observations were made by myself, and the reductions were made for the most part by my assistant, Mr. M. McNeill, under my direction. The details of the work will appear in full in the "Washington Observations" for 1879.

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Clock-comparisons were obtained on *seven* nights. After applying all corrections, that for my own personal equation being probably the most uncertain of them, these comparisons give the following results for the difference of Longitude between the *Dome of the Naval Observatory* at Washington and the Princeton *Meridian Circle.*

Date.		Δλ	Weight.
		m s	
1879, Jan.	18	−9 34·716	½
	22	34·491	1
	23	34·618	1
	30	34·556	1
March	5	34·401	½
	7	34·546	1
	12	34·438	1
Mean by weights ...		−9 34·538 ± ·021	

The discordances are larger than desirable, and are probably due mainly to my own unsteady personal equation, resulting from ill health at the time of the observations; partly also to a serious instability in the Y's of the Princeton Meridian Circle, which was not discovered and remedied until the work was nearly finished. It is believed, however, that the final result is substantially correct.

For the Latitude of the Observatory we have five closely-accordant determinations, by two different observers with three instruments. Four of the determinations were made by the Zenith-telescope method, and one by the Prime-vertical instrument.

Series I. consists of 82 observations of 28 pairs of stars on 9 nights, made by A. S. Flint in the early part of 1879, with the instrument known in the Observatory as the "Kahler Transit." It was made by Kahler of Washington, and has a "broken telescope" of 2¾ inches aperture and 31 inches focal length. It is provided with a reversing apparatus, with a delicate "latitude level" attached to the telescope tube, and with a declination micrometer; so that the instrument can be used as a zenith-telescope in the manner first proposed by Professor Lyman. It is in every way a most convenient and satisfactory instrument.

Series II. consists of 59 observations of 42 pairs, made by Mr. McNeill on two nights in May 1880.

Series III. consists of 114 observations of 49 pairs by the same observer and instrument on three nights in Sept. 1880.

Series IV. consists of 33 observations of 29 pairs by the same observer on two nights in Sept. 1880, made with the so-called Fauth Transit. This instrument, by Fauth and Co. of Washington, is a Transit of the ordinary form with a straight telescope of 3 inches aperture and 45 inches focus, carrying a diagonal

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eyepiece and micrometer. It has a reversing apparatus, and a latitude level attached, not to the tube of the telescope, but to one of the 12-inch finding-circles on the axis. The field of view is rather restricted, and this renders the instrument much less convenient than the other for latitude work, though it is better for time determinations.

All of these observations were reduced under my direction by Mr. McNeill, and in substantially the same way. With approximate values of the micrometer constant and latitude, equations of condition were formed: the solutions of these equations by least squares furnished the necessary corrections to the assumed values. Thus the results depend entirely upon the star-declinations adopted and the observations themselves, without involving any subsidiary observations, made under different circumstances to determine the micrometer constant.

The declinations used were taken from the following Catalogues in the indicated order of preference.

1. Boss's Catalogue of 500 stars, published by the U.S. Northern Boundary Commission in 1878.
2. Auwers' "Fundamental Catalog" of 539 stars (Astron. Gesellschaft, 1879).
3. Safford's Catalogue of 2,018 stars, published by the U.S. War Department.
4. Catalogue of 2,179 stars contained in the Report of the U.S. Coast Survey for 1876.

The fifth series consists of 37 Prime-vertical latitude determinations from 11 different stars, made by Mr. McNeill in Jan. and Feb. 1881. The instrument is an old (but excellent) 3-inch Transit by Berge of London, fitted with an iron stand and reversing apparatus by Stackpole of New York, and with a striding level by Kahler.

26 of the 37 observations were made and reduced by Struve's method, the star being caught on both sides of the meridian; 15 of the 26 were observations of *α Lyræ*.

The pier of the Kahler instrument is in the same latitude as the Meridian Circle; the Fauth Transit is 0″·025 north, and the Prime-vertical instrument 0″·186 south. Applying the necessary corrections, the five results for the latitude of the *Meridian Circle* are as follow, viz.—

Series I.	40° 20′ 57″·791 ± 0″·148
„ II.	57·763 ± 0·116
„ III.	57·815 ± 0·067
„ IV.	57·771 ± 0·173
„ V.	57·775 ± 0·088

The probable errors are deduced from the residuals of the equations of condition combined with the probable errors of the star declinations.

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Giving each result a weight inversely proportional to the square of its probable error, and taking the weighted mean, we get as the astronomical Latitude of the Princeton Meridian Circle 40° 20′ 57″·792 ± 0″·044.

I am indebted to the Superintendent of the U.S. Coast and Geodetic Survey for data which determine our *Geodetic* Latitude and Longitude, when taken in connection with a survey made in 1877 under the direction of my colleague Professor McMillan, for the purpose of ascertaining our distance and direction from the cupola of the Theological Seminary, which is a Coast Survey point. "My Meridian Circle was found to be $2869^{\text{ft}}\cdot8$ east, and $1130^{\text{ft}}\cdot9$ north, of the seminary; giving a difference of longitude of 37″·04, and a difference of latitude of 11″·17."

According to the latest Coast Survey data, the geodetic Latitude and Longitude (from the meridian of Greenwich) of the Seminary cupola are respectively 40° 20′ 42″·842 and 74° 39′ 53″·942. For the astronomical Longitude of the Meridian Circle from Greenwich we get 74° 39′ 22″·47 by applying the observed difference of longitude ($9^{\text{m}}\ 34^{\text{s}}\cdot538$) to the adjusted telegraphic longitude of the Washington Dome as adopted by the Coast Survey—viz. 77° 03′ 00″·54.

We thus have for the Princeton Meridian Circle the following data:—

	Latitude.	Longitude from Greenwich.
	° ′ ″	° ′ ″
Astronomical ...	40 20 57·79	74 39 22·47
Geodetic	40 20 54·01	74 39 16·90
A − G	+ 3·78	+ 5·57

Reducing these deviations to a single one, it appears that gravity at Princeton is deflected towards the south-east by 5″·68 according to the Coast Survey determinations which are based upon Clarke's spheroid.

This, I understand, is perfectly in accordance with results obtained by the Coast Survey at other points in this region.

A line of levels carried down to the Delaware and Raritan Canal shows the axis of the Circle to be 214·5 feet above the mean sea level in Raritan Bay.

In order to prevent confusion it may be well to add that the *Halsted Observatory* in which the great Equatoreal of 23 inches diameter is soon to be mounted, is an entirely different building from the School of Science Observatory. It is about 2,000 feet distant to the west and north, but its position has not yet been carefully determined.

Princeton, N.J.:
1881, *May* 13.